

What is claimed is:

1. A composite ion selective electrode comprising
 - 5 (1) a calcium ion selective electrode member and a hydrogen ion selective electrode member,
in which the calcium ion selective electrode member comprises an electro-insulating support, a pair of electrode units each of which comprises a silver layer and a silver halide layer, and which are electrically separated from each other, an electrolyte layer, and a calcium ion selective membrane, and
 - 10 (2) an electro-insulating member having two openings in which one opening is provided for introducing a sample liquid into the composite electrode and another opening is provided for introducing a reference liquid into the composite electrode;
 - 15 (3) a pair of distributing members in which one member distributes the introduced sample liquid to the ion selective membrane of each ion selective electrode member at a site corresponding to one electrode unit and in which another member distributes the introduced reference liquid to the ion selective membrane of each ion selective electrode member at a site corresponding to another electrode unit; and
 - 20 (4) a bridge member which is provided on the electro-insulating member to bridge the two openings of the electro-insulating member so as to electrically connect the introduced sample liquid and the introduced reference liquid;

which is characterized in that the calcium ion selective membrane has a thickness of 5 to 30 μm , and the hydrogen ion selective membrane contains tri-n-dodecylamine and triethylhexyl trimellitate.

5

2. The composite ion selective electrode of claim 1, wherein the calcium ion selective membrane contains calcium di[4-(1,1,1,3-tetramethylbutyl)phenyl] phosphate.

10

3. The composite ion selective electrode of claim 2, wherein the calcium ion selective membrane comprises a vinyl chloride-vinyl acetate copolymer, dioctylphenyl phosphonate, and calcium di[4-(1,1,1,3-tetramethylbutyl)-phenyl] phosphate.

15

4. The composite ion selective electrode of claim 1, wherein the thickness of calcium ion selective membrane is in the range of 5 to 20 μm .

20

5. The composite ion selective electrode of claim 4, wherein the thickness of calcium ion selective membrane is in the range of 10 to 18 μm .

25

6. The composite ion selective electrode of claim 1, wherein the hydrogen ion selective membrane has a thickness of 5 to 30 μm .

30

7. The composite ion selective electrode of claim 1, wherein the electrolyte layer comprises sodium chloride.

8. A method for determining a standardized calcium ion concentration in a sample blood, which comprises the steps of:

35

spotting a sample blood and a reference liquid onto openings of the electro-insulating member of the compos-

100-2050

ite ion selective electrode of claim 1, respectively; measuring potentiometrically a calcium ion concentration and a hydrogen ion concentration in the sample blood; and

5 incorporating the measured calcium ion concentration and the measured hydrogen ion concentration into the following equation to obtain a value of Log (standardized iCa):

10 Log (standardized iCa) =
 Log (iCa at pH) - 0.22 x (7.4 - pH)

in which iCa means a calcium ion concentration and pH means a hydrogen ion concentration.

- 15
9. A calcium ion selective electrode comprising
- 20 (1) a calcium ion selective electrode member which comprises an electro-insulating support, a pair of electrode units each of which comprises a silver layer and a silver halide layer, and which are electrically separated from each other, an electrolyte layer, and a calcium ion selective membrane;
- 25 (2) an electro-insulating member having two openings which is provided on the calcium ion selective electrode member and in which one opening is provided for introducing a sample liquid into the composite electrode and another opening is provided for introducing a reference liquid into the composite electrode; and
- 30 (3) a bridge member which is provided on the electro-insulating member to bridge the two openings of the electro-insulating member so as to electrically connect the introduced sample liquid and the introduced reference liquid;
- 35 which is characterized in that the calcium ion selective membrane has a thickness of 5 to 30 μm .

10. The calcium ion selective electrode of claim 9, wherein the calcium ion selective membrane contains calcium di[4-(1,1,1,3-tetramethylbutyl)phenyl] phosphate.

5

11. The calcium ion selective electrode of claim 10, wherein the calcium ion selective membrane comprises a vinyl chloride-vinyl acetate copolymer, dioctylphenyl phosphonate, and calcium di[4-(1,1,1,3-tetramethylbutyl)-phenyl] phosphate.

10

12. The calcium ion selective electrode of claim 10, wherein the thickness of calcium ion selective membrane is in the range of 5 to 20 μ m.

15

13. The calcium ion selective electrode of claim 12, wherein the thickness of calcium ion selective membrane is in the range of 10 to 18 μ m.

14. The calcium ion selective electrode of claim 10, wherein the electrolyte layer comprises sodium chloride.

25

15. A hydrogen ion selective electrode comprising

25

(1) a hydrogen ion selective electrode member which comprises an electro-insulating support, a pair of electrode units each of which comprises a silver layer and a silver halide layer, and which are electrically separated from each other, an electrolyte layer, and a hydrogen ion selective membrane;

30

(2) an electro-insulating member having two openings which is provided on the hydrogen ion selective electrode member and in which one opening is provided for introducing a sample liquid into the composite electrode and another opening is provided for introducing a reference liquid into the composite electrode; and

(3) a bridge member which is provided on the electro-insulating member to bridge the two openings of the electro-insulating member so as to electrically connect the introduced sample liquid and the introduced reference

5 liquid;

which is characterized in that the hydrogen ion selective membrane contains tri-n-dodecylamine and tri-sethylhexyl trimellitate.

10 16. The hydrogen ion selective electrode of claim 15, wherein the hydrogen ion selective membrane comprises tri-n-dodecylamine, triethylhexyl trimellitate, potassium tetrakis(p-chlorophenylborate) and a vinyl chloride-vinyl acetate copolymer.

15

17. The hydrogen ion selective electrode of claim 15, wherein the hydrogen ion selective membrane has a thickness of 5 to 30 μm .

20

18. The composite ion selective electrode of claim 15, wherein the electrolyte layer comprises sodium chloride.

25